

ABSTRACT

We describe a variable bandwidth tunable optical spectral filtering device and associated method for selectively directing a portion of a wavelength multiplexed input signal, entering through one or more optical fibers, into one or more output signals provided to one or more optical fibers and/or electronic outputs. The optical filtering is accomplished using free-space diffractive wavelength de-multiplexing optics combined with a fixed (permanent) patterned structure located in the spectrally dispersed image plane. The structure can direct a selected spectral portion of the optical signal to one or more separate outputs, such as an optical fiber or power detector. A single active element in the optical path is used to spatially shift, or steer, the entire input spectrum at the dispersed spectral image plane, to control the portion of the input spectrum illuminating specific features on the permanent patterned structure. In one preferred embodiment, a device with a fixed selective area triangular shaped tilted reflective facet on a flat reflective surface is constructed such that the light reflected off the flat reflective surface and off the triangular reflective facet are selectively multiplexed back and directed to different output fiber ports. Inputs at different angles of incidence on the reflective structures may be deflected by the same structures to different output port fiber ports. A reconfigurable variable-bandwidth tunable optical add/drop multiplexing device is constructed using such a filtering device and an application of such an add/drop multiplexing in a optical transport network is demonstrated.